TECHNICAL BRIEF

The role of systems in capturing vital data for civil registration, identification, and health surveillance amid the COVID-19 pandemic: **A good practice example from Rwanda**

INTRODUCTION

The Republic of Rwanda is taking preventive measures to respond to the spread of the COVID-19 pandemic and its impact on the population's health and safety. These preventive measures include lockdowns of its territory at various stages: people were initially required to stay at home and travel only for buying and/or consuming essential goods and services. A strict ban on unnecessary travel was imposed, and public and private institutions were forced to adopt telework to maintain productivity and ensure that their business activities could continue.

Full lockdown was first imposed starting 20 March 2020, after the first case of COVID-19 landed in the country on 13 March 2020. In many countries, such restrictions had and continue to have devastating effects on the delivery of public services. Negative effects are expected to continue during the transition phase and until national life fully recovers from the shock of COVID-19.

The purpose of this brief is to document the role of systems in capturing vital data for civil registration, identification (ID), and health surveillance amid the COVID-19 pandemic. The objective is to

- document the innovative trends and technologies, and areas for further development in civil registration and vital statistics (CRVS) and identity innovation systems to expand our understanding of their role and value during this period;
- describe the data elements collected; and
- explore how the data is used or could be used to monitor key health indicators (number of deaths, causes of death, excess deaths) and health surveillance.

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INNOVATIONS IN TECHNOLOGY, PRACTICES, PROCESSES, AND SYSTEMS IN RWANDA

Rwanda's identity ecosystem supports the country's aspirations for digital transformation. As part of the Digital Rwanda vision, government services and economic transactions are delivered electronically. This approach is more convenient for the population and is more efficient and transparent, even during disasters such as the pandemic.

The country has several identity assets, which are harmonized (or are being harmonized). As a whole, they

- allow universal identification of the population so they can assert their rights at all stages of their lives; and
- help government agencies, such as social protection, to improve the delivery of services and benefits during health crises.

These identity management innovations are described in detail in this paper.

Rwanda's online platform: Irembo

Through a public-private partnership, the government was able to build and operate an e-government platform, Irembo, through which all government services are delivered. The aim is to transform public service delivery, improve access to information, and promote transparency. Through Irembo, citizens have access to integrated government services via the internet and mobile devices.

Today, Irembo hosts over 100 e-services from various government agencies, with more than 90,000 users per month.[1] The services are available online, on USSD,[2] and through a network of support agents. As the population's awareness of Irembo increases, the platform has set out to harness the existing ecosystem (such as telecoms, infrastructure, human resources, and payment gateways) by increasing the number of payment channels, access points, field agents, and overall user rates. The service is designed to improve the citizen's way of life by making government services easier, faster, and less costly to access. Irembo plans to

- increase the number of e-services citizens can access;
- increase its nationwide access points to get even closer to each citizen in the country; and
- re-engineer government services to complement the paperless and cashless economy that Rwanda is striving to achieve.

1 Irembo website. irembo.gov.rw/home/citizen/all_services

2 Unstructured Supplementary Service Data (USSD) uses codes available on a mobile phone.

It is estimated that 11 million people have been served, many public and private institutions are on board, and more than 200,000 electronic certificates have been delivered.[3] The system has reduced the amount of time people must wait to get services. A rough estimate by Irembo indicates that over the past five years, having a centralized platform helped people save more than 24 million hours of going to offices to apply for and pick up certificates and going to banks to pay for services.

Irembo has made it possible to keep government services available and uninterrupted, even during months of partial or total lockdown and traffic restrictions. Services were provided online during a time when population movements were stopped or very limited. CRVS and identification-related services, such as death registration, were provided online without any physical contact or human interaction during the peaks of the COVID-19 pandemic.

In essence, Irembo is an interface between the public and services that takes advantage of identity information in the National Population Register (NPR). Each time an e-government service is requested, identity information in the NPR is accessed to verify that the identity of the person requesting the service is genuine and — based on the identity characteristics (including date of birth) — that person qualifies for the requested service.

The current procedures for updating the NPR have made it possible to expand the database and update the essential information it contains. Today, we estimate that it contains about 11,446,349 pieces of information on citizens, or 93 percent of the resident population of about 12,374,397.[4] The database continues to grow at a high rate, so that it is possible to track the annual birth rate at this stage. Registration in the NPR is mandatory for Rwandans and foreigners, including refugees, of all ages; this includes children, who by law must be registered by their parents or guardians.

The National Centralized and Integrated CRVS System

A new system, called the National Centralized and Integrated CRVS (NCI-CRVS) System, was launched on 10 August 2020 as part of the Africa CRVS Day celebrations; it is interoperable with the NPR using a unique identification number assigned at birth. This interoperability ensures that each time a new vital event in a person's life is registered in the CRVS system, that information is used to update the person's identity characteristics in the NPR. This positions NCI-CRVS as a central system for safeguarding the accuracy of identity information in the NPR.

This NCI-CRVS is already being used in major hospitals in a pilot phase. It is to be extended to all health facilities across the country for live births and deaths occurring there and at some of the lowest administrative points of contact (cells) with the population for events occurring at home.

3 Irembo website. irembo.gov.rw/home/citizen/all_services

4 National Institute of Statistics of Rwanda. 2014. 2012 National Population and Housing Census. statistics.gov.rw/publication/rphc4-atlas

The new system allows notification by nurses and declaration by the person accompanying the mother, or by the mother herself. Registration is done at the health facility: the informant provides his or her telephone number so that once registration is done, a text message (SMS) is sent to the informant's mobile phone with the national registration number. The informant can then request the digital birth certificate through Irembo.

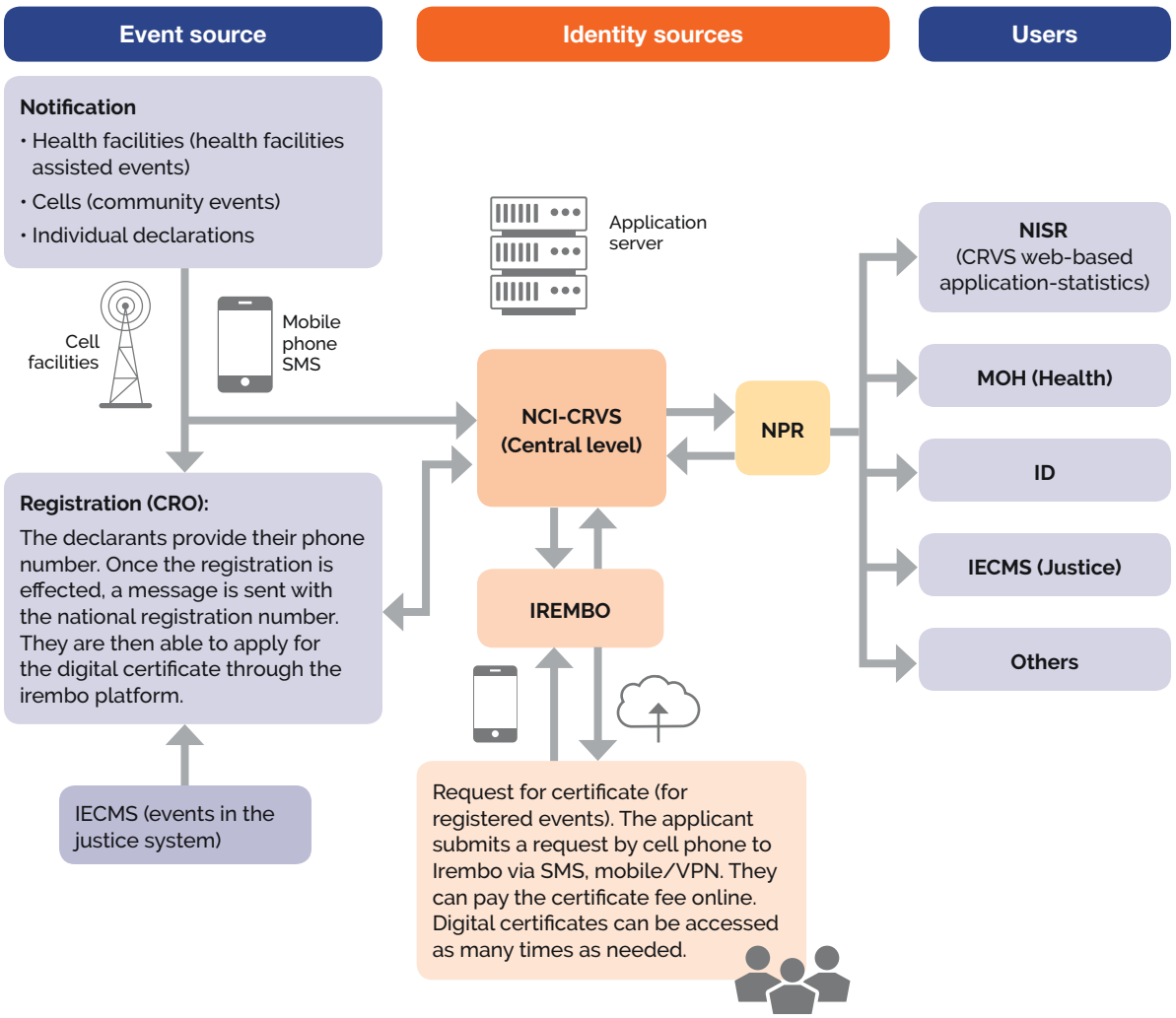
Once the applicant has obtained the certificate, it is stored in the system. It can be viewed as many times as needed or printed. Some certificates, such as marriage certificates, last for only three months in the system; the applicant can reapply electronically, if needed. Keeping the digital certificate in the system has been helpful for citizens, as they no longer have to request it every time they need it, but can download it or print it themselves.

Currently, only births and deaths can be registered as described above in the NCI-CRVS. Other modules are being developed to enable electronic notification and registration of marriages, divorces, and marriage annulments, which will be integrated into the Ministry of Justice's electronic records management system. After the court proceedings, notifications will be sent to the civil registration agency to complete the process and issue the respective certificates. The four remaining events (adoptions, legitimation, recognition, and guardianship) will be developed by the end of 2021.

There is a link to the National Institute of Statistics to extract vital statistics to produce the reports. The data is also transmitted to the social registry system to provide services, particularly for newborns, who require health insurance immediately after birth. Rwanda hopes to digitize all nine vital events by 2021 to have a comprehensive CRVS system that records all vital events: from notification to registration and certification. The system will also allow for the production and storage of digital certificates and, over time, the development of family trees.

The NPR will be automatically updated as information is entered into the NCI-CRVS database. All users, such as functional registries, will also have access to the NPR for delivering services to citizens and residents with full respect for the protection of personal data and privacy. It is anticipated that over the next few years, all government agencies and services will be fully supported by this new system. It is also expected that the traditional census will be lightened by a system output that will count living populations geographically across the country.

Figure 1: NCI-CRVS system architecture.



The national identity database and the national identity number

In addition to the NPR, which covers the entire population, another database covers only those 16 years of age and older and contains biometric data. These individuals must visit an enrolment centre within six months of their 16th birthday to complete their biometric enrolment (including two fingerprints and a photograph) and apply for a national ID card.

Currently, 99 percent of eligible citizens have ID with biometrics (photographs and fingerprints) in the National Identity Database, which corresponds to around 56 percent of the total resident population. The identity card is considered personal property. It must be requested in person at the registry office where the person has been registered in the NPR or, for special circumstances, at the head office of the identification agency in Kigali.

National Institute of Statistics of Rwanda's CRVS web-based application

The CRVS web-based system allowed the civil registry to capture and store events that occurred in health facilities during the period of total or partial closure due to COVID-19. Some community deaths were also reported in the system in the 20 percent of villages where the government is piloting the implementation of the World Health Organization verbal autopsy tool. It remains to be seen whether the data on causes of death reported in the system have been useful for health surveillance: the Ministry of Health and its partners have had to make enormous efforts to ensure that the quality of the causes of death reported in the system is improved before the information is used for decision-making.

Figure 2: CRVS web-based application.

The application was developed in 2015 by the National Institute of Statistics of Rwanda in collaboration with the Ministry of Local Government, the Ministry of Health, and the National Identification Agency.

- This system facilitates the collection, storage, and production of data on civil status events (birth, death, marriage, divorce, adoption, recognition, and guardianship), including causes of death, through the registration sites of the 416 sector offices and online notifications in all health facilities (birth and death) and courts (divorces and other civil status matters settled in a judicial setting).
- The developers added capabilities for both human resources and the IT infrastructure required for sector offices, health facilities, and courts.

- The software was developed at a reasonable and affordable cost.
- The development of the web-based application was in line with the National Strategy for the Development of Statistics,[5] where one of the strategic objectives is to strengthen the civil registration system as a source of vital statistics.

This clearly shows that this system was designed primarily for statistical purposes to ensure complete coverage of vital statistics, but its role in the registration process should not be underestimated. It allows for the capture of individual cases with characteristics similar to those that an electronic vital register should capture, such as

- names of individuals;
- telephone numbers;
- age, date, and place of vital events;
- causes of death; and
- other demographic information.

The CRVS web-based application thus plays the role of electronic notification of vital events and has played a major role during the COVID-19 crisis. Civil registration offices are aware of all events that have taken place in key institutions such as health facilities. Once lockdowns and limited movements are lifted, offices must contact these institutions for official registration.

The web application has several advantages: for example, health facilities are connected to the sectors' registration offices through web interfaces. This means that all births and deaths at these entities are captured and automatically transferred to the respective sectors' registration office for confirmation and official registration.

A large number of deaths occur outside health facilities, which means they are not notified in a timely way and are not recorded in the CRVS system. This generally leads to under-reporting of deaths and causes of death. As a solution to this issue, a new platform known as Home-Based Care Practitioners has been piloted at the cell administration level to boost the reporting of community deaths and probable causes of death using verbal autopsy techniques that are internationally recognized. The Home-Based Care Practitioners program was initiated to do follow-up for palliative care patients who have chronic diseases, including end-of-life care and bereavement support to families. This approach could in turn

- reduce hospital costs;
- make beds available for other patients;
- do follow-up for stable patients with non-communicable diseases at home;
- screen for non-communicable diseases; and
- conduct verbal autopsies using standardized Smart VA[6] questionnaires.

5 National Institute of Statistics of Rwanda. 2008. National Strategy for the Development of Statistics 2009–2014. statistics.gov.rw/publication/first-national-strategy-development-statistics-2009-2014

6 Smart VA is an application for conducting verbal autopsies.

The home-based care staff were differentiated from voluntary community health workers by their educational background and responsibilities. These staff were trained to notify community deaths in a CRVS web-based system and conduct verbal autopsies to determine a probable cause of death for deaths occurring in the community. The CRVS web-based application is linked with the Inter-VA questionnaire installed on their Android tablets. The program was piloted in 20 percent of administrative cells across all provinces of Rwanda and has been successful.

The recently launched NCI-CRVS communicates closely with this CRVS web application to avoid duplication and overlap of resources and to ensure quality assurance and quality control. Information exchange mechanisms are clearly defined. The interaction between the two systems will allow possible unauthorized practices such as multiple registrations concerning individual civil status to be detected.

Before the NCI-CRVS was developed, a preliminary analysis of the CRVS web application was done to check whether it met the requirements for being a national electronic system for capturing, managing, and storing civil status assets. The assessment revealed that a new, more robust system is needed. The development of the new system was based on lessons learned from implementing the previous system. The old system will be maintained for statistical purposes. Protocols for interoperability and links between the systems are in place to ensure a smooth exchange of information and data between the systems, while respecting the protection of personal data and privacy. The *Data Protection and Privacy Act* has been enacted to regulate the production, access, and use of data in a responsible manner.

HOW VITAL EVENTS WERE REPORTED DURING THE COVID-19 LOCKDOWN

Civil registration and identification services are provided by local administrative entities, from the lowest to the highest level: villages, cells, sectors, and districts.

- The villages are responsible for providing any form of proofs to the registrar for official registration.
- The cells are responsible for providing written notification of the occurrence of a vital event.
- The sector executive secretary carries out official registration at the sector level.
- The district mayor, who is the highest decentralized local authority, is also a *de jure* registrar. He or she provides civil registration services when the lower levels are not able to do so due to various possible circumstances.

Due to COVID-19 restrictions, the registration of some civil status events, such as marriage, was put on hold or done by appointment. Registration of key events was done through online platforms. Notification services for events occurring in health facilities was done virtually; any delays in registering vital events requiring face-to-face contact would be done later. When the lockdown was relaxed, more birth and death registrations were recorded; other events, such as weddings, continued to be suspended for a few months.

The registration of some events was done online, without any human contact; certificates were produced and issued in the same way. Applications for the registration of births and deaths and the certification of all vital events were submitted to the local registrar to be processed online using the following steps:

1. **Citizens sign up on the Irembo platform** using the national ID and the phone number registered to the ID (or, if they are already registered, they simply sign in to Irembo). The request can also be made by USSD.

2. **The user asks to register a life event.** In the case of a death, for example, the request is submitted to the registrar of the area where the deceased was living. The user must attach the appropriate documents:
   - Medical certificate of death (if the death occurred in hospital);
   - Approved cell report (if the death occurred at home);
   - Copy of the passport (if the deceased is a foreigner); and
   - Court decision (if the death was not registered within 30 days).

   There is no charge for this registration.

3. **The applicant pays the fee if there is a charge for the service.** After completing the application, the applicant uses the billing number received by phone, SMS, or email to pay online with a credit card or chooses another option (mobile money with some telecom companies, or pay at the bank).

4. **Once payment is made, the applicant receives another SMS and/or email to confirm the payment.** If they do not receive an SMS and/or email within 30 minutes, they are to call 9099 for assistance.

5. **The local registrar reviews the application once it is received.** Applicants then receive an SMS informing them that their application has been approved or rejected. If approved, the certificates are ready to be printed. If applicants do not receive a text message within three business days, they are to contact or visit their local registry office.

Citizens who do not have the technical means to follow the above instructions must normally go to the agents (found in all villages) for assistance. However, this was not encouraged during the total lockdown to prevent transmission of COVID-19.

The payment for these services has mostly been via mobile money payments. The total number of active mobile phone subscriptions in Rwanda grew from nearly 9.7 million at the end of May 2020 to almost 9.9 million at the end of June 2020 — an increase of 2 percent.[7] As a result, the number of mobile subscriptions per 100 inhabitants increased by 1.6 percentage points, from 76.3 percent to 77.9 percent.[8]

7 Active mobile cellular telephone subscriptions are the number of SIM cards that have generated revenue to the operator within the last 90 days.

8 Mobile cellular telephone subscriptions per 100 inhabitants: mobile (SIM cards) penetration rate.

Testimony of a local registrar on the Irembo platform

"The use of the IremboGov site has really helped us in the Gitega sector, Nyarugenge district. Before we started using IremboGov, we had a lot of manual work because of the many documents and papers we physically signed. Citizens were asking for different services and we had to use lists to register those who were asking for services. The documents would then pile up.

With the introduction of the IremboGov site, citizens no longer line up at public offices to request services and wait for leaders to sign their documents. Today, when a citizen requests a service with all the requirements, we approve the document and send it to them instantly.

Even during the COVID-19 lockdown, we provided documents to citizens. The numbers were not high, but we still provided the documents from home. We checked the site daily to ensure that no citizen was denied service. We provided services even though the numbers were low. For example, we received requests to replace the national ID card, a child's birth certificate, a marriage certificate, and we were able to continue to provide these services during the period of confinement."[9]

— Umutesi Jacqueline, civil registrar and notary

Mobile money, which facilitates safe and efficient money transfer and payment services, has proven to be an invaluable tool for fostering resilience. To shield the most vulnerable user segments, the Government of Rwanda, through the National Central Bank and all mobile money providers (MTN Rwanda and Airtel Rwanda) and their regulators, has responded with rafts of measures aimed at achieving two broad outcomes:

- Limiting the spread of the COVID-19 virus by encouraging digital payments; and
- Easing the cost-of-living burden on citizens who use digital payments.

Measures taken include:

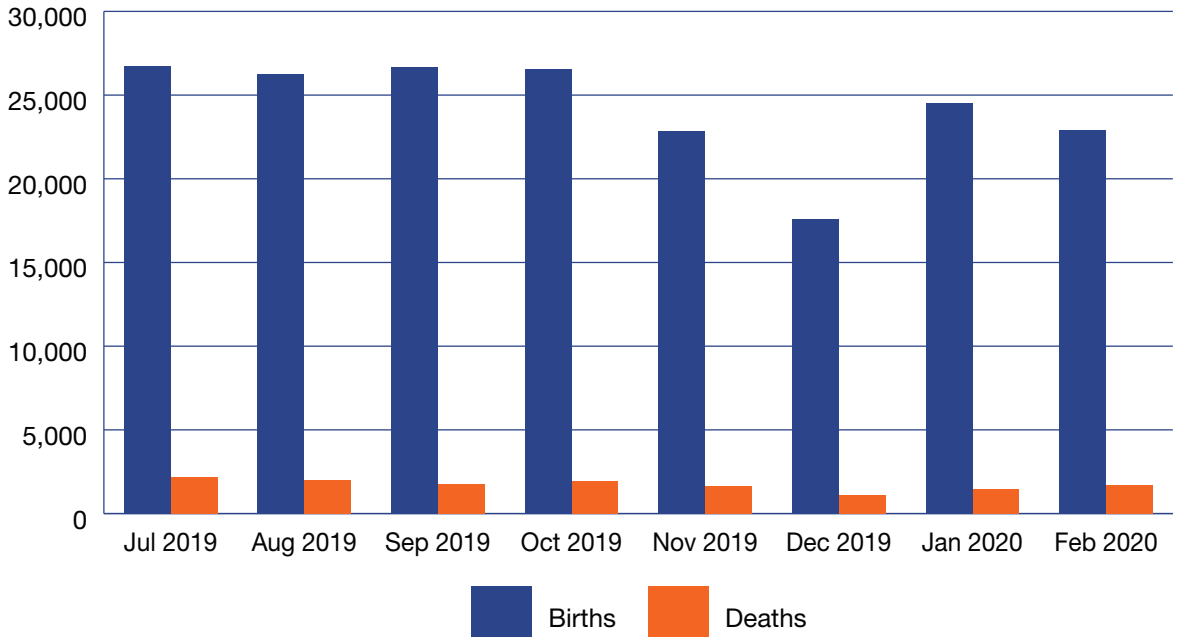
- All fees have been waived on person-to-person transactions.
- Registration requirements for new customers were relaxed and self-registration was allowed. The rationale for this intervention was to reduce contact between mobile money users and agents and to encourage more people to use digital financial services rather than cash, including the unbanked.
- Fees for bank-to-wallet and wallet-to-bank transactions have been waived. This measure was geared to stimulating electronic float top-ups in place of face-to-face cash-in transactions at agent outlets, which carry the risk of transmitting the virus.
- The country is supporting mobile money agents, whom it has identified as designated essential service providers. This ensures continued access to cash-in/cash-out facilities.
- Transaction and balance limits have been increased. To facilitate trade and the purchasing of essential items, including medicine, mobile money providers have obtained regulatory approval to increase transaction and wallet balance limits. This gives small businesses incentives to accept mobile money payments while relying less on cash payments.

9 IremboGov Twitter account. 29 September 2020. twitter.com/i/status/1310905639263141888

CIVIL REGISTRATION DATA BEFORE AND DURING GOVERNMENT MEASURES TO PREVENT THE SPREAD OF COVID-19

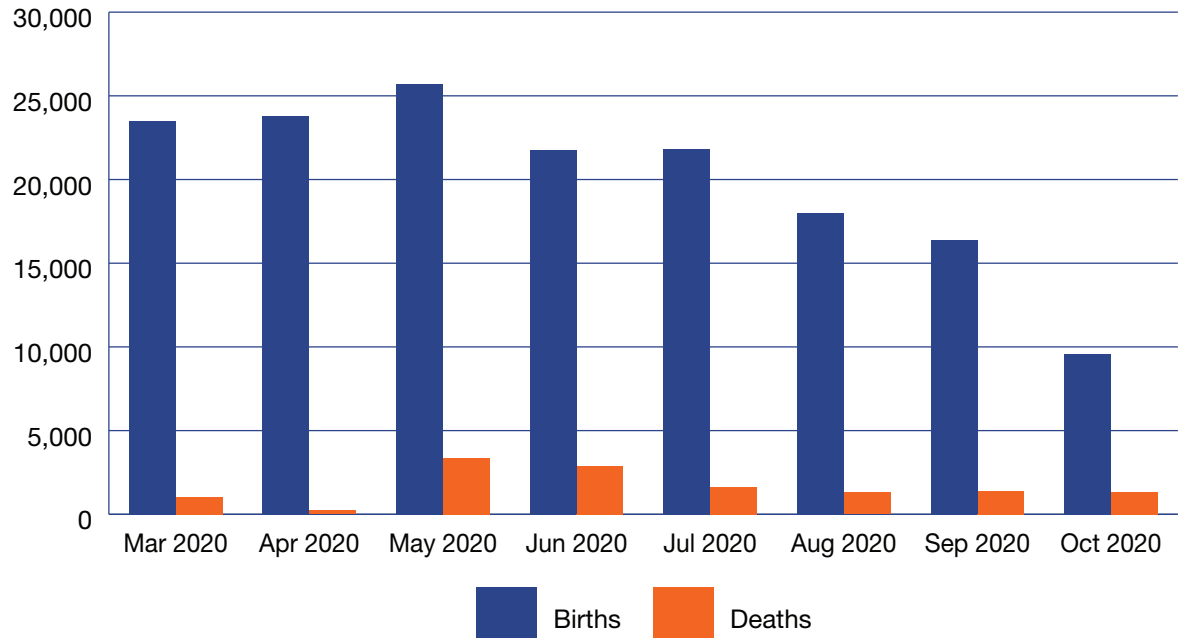
To understand the extent to which civil registration services continued during the COVID-19 pandemic, it is useful to compare the number of vital events recorded eight months before the first confirmed case of COVID-19 and those recorded during periods of lockdown and restricted movement. This will help measure how innovative approaches have ensured that essential services are not suspended, while maintaining World Health Organization and Ministry of Health guidelines. We have used examples of live births and deaths as top-priority events to be recorded simply to indicate business continuity and not to underestimate the importance of recording other vital events if a health crisis occurs.

Figure 3: The registration of births and deaths eight months before the first confirmed case of COVID-19 in Rwanda.



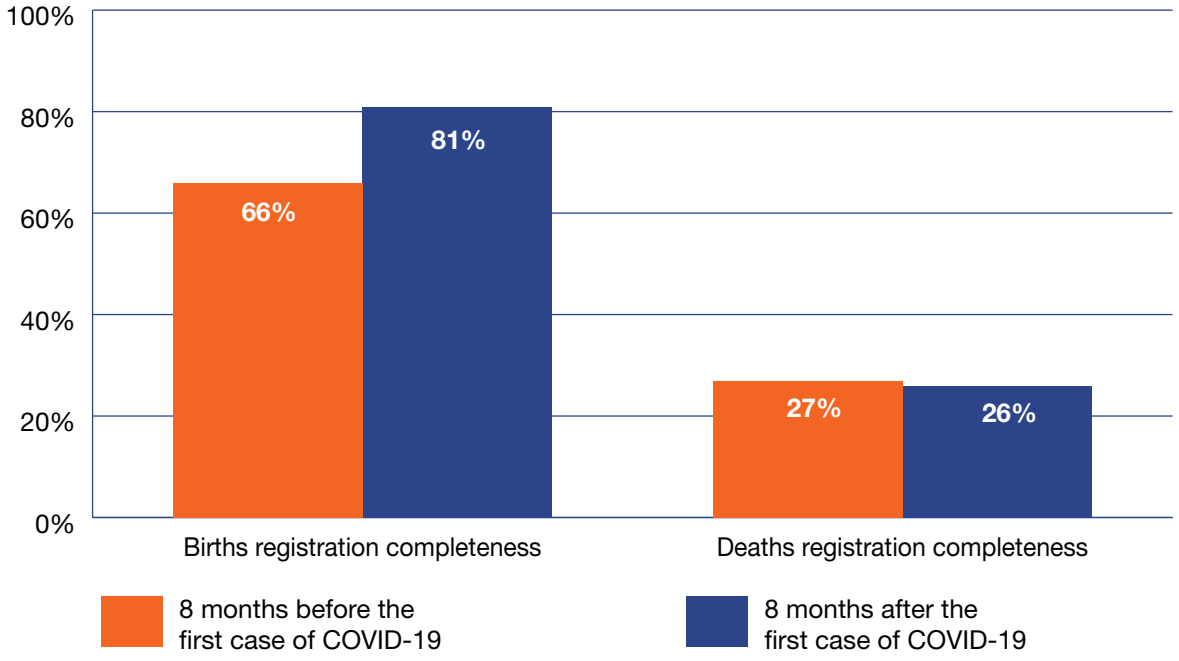
Source: National Identification Agency and National Institute of Statistics of Rwanda data, 2019

Figure 4: Registration of births and deaths eight months after the arrival of the first positive case of COVID-19 in Rwanda.



Source: National Identification Agency and National Institute of Statistics of Rwanda data, 2020

Figure 5: Registration completeness.



The calculated completeness rate of birth and death registration indicates that there is not much difference in the level of completeness before and after the first case of COVID-19 landed in Rwanda. A slight difference is likely due to the fact that we have assumed a normal distribution of births over the entire 12 months of the year, and we have taken into account only a few months of the year for which data are available. Civil registration activities have continued thanks to Rwanda's identity ecosystem: it is in a very good general state of development and is able to sustain activities during the pandemic by providing online services that avoid human contact.

Elements captured for death registration

The matrix below provides the information on death registration captured by the Rwandan CRVS system. The data elements are captured on the death registration form, as required by the Government of Rwanda's Ministerial Order No 001/07.01.

Table 1: Information collected for death registration.

Characteristics of the **death (event)**	**Geographic characteristics**	Characteristics of the **decedent**
• Date of death (occurrence) • Date of registration • Registration number • Cause of death	• Place of death • Type of place of death (home or hospital) • Place of registration	• Name • Personal identification number (ID) • Date of birth • Sex • Citizenship/nationality • Usual occupation • Place of usual residence
Characteristics of the father	**Characteristics of the mother**	**Characteristics of the declarant (informant)**
• Name of the father • Age • Place of residence • Usual occupation • Citizenship/nationality • Personal identification number (ID)	• Name of the mother • Age • Place of residence • Usual occupation • Citizenship/nationality • Personal identification number (ID)	• Name of the declarant • Personal identification number (ID)

KEY LESSONS AND RECOMMENDATIONS FROM THE RWANDA CRVS AND IDENTITY SYSTEM

1. Establish resilient systems

Measures need to be put in place for resilient systems. Civil registration and identification systems in Rwanda are all online and were not interrupted during the pandemic. All governments should strive to replace, to the extent possible, face-to-face service delivery with digital service delivery where there is a demonstrated advantage.

2. Create a link between paper-based civil registration and an electronic National Population Register (and consequently, the national identity card)

In Rwanda, the NPR covers over 93 percent of the population. More than 6.5 million people (over 90 percent of adults aged 16 and over) in Rwanda carry a robust national identity card; an adult unique identifying number (national identity number) is in place. Although the civil register itself remains on paper ledgers distributed throughout the country, the National Identification Agency collects this information and integrates it electronically into the NPR on an ongoing basis; this overcomes the challenges and limitations of the paper register. While the link is not automatic at this stage, as it involves several manual steps, this stop-gap measure is effective in linking paper-based registration to computerized systems, until an electronic civil registration emerges. This administrative procedure could serve as a model for integration between paper-based civil registration processes and electronic national population registers, which may be worth exploring in other African contexts.

In general, links between a civil registration system and an NPR are highly desirable: this ensures that identity information is provided in a robust and consistent way from cradle to grave. This task is much more difficult if the registers, or at least one of them, are on paper, which is often the case in the African context. This leads to a lost opportunity, where authorities wait for the civil registration system to be modernized before they attempt to link it to the NPR. The Rwandan model is a good temporary solution while the country tries to do full digitization of notification, registration, certification, and information sharing.

3. Establish online services as an integral part of the process

The government has put in place a scalable identity verification service, which it makes available to the various parties that go through the required information security certification. Online identity services are the ultimate facility for uninterrupted services during a health crisis such as COVID-19. They are also a fraud-combating tool in any identity ecosystem. If the Rwandan ID card is falsified, the falsification would be detected during the online identity verification, since no unauthorized alteration can be made to the database. These services are also essential for facilitating the electronic integration of different registers. For example, the electoral register is linked to the NPR via the online identity verification services; these can be used to verify the true identity of a potential voter seeking to enrol in the voter roll.

4. Operate at a break-even level

Rwanda has attained self-sufficiency in this area: it does not burden people with high fees, nor does it require government funds to operate. For several years now, the system has operated at a break-even level, where its entire budget is covered by fees from the services it offers. The country is able to do this while maintaining a subsidized identity card by using its infrastructure to offer other types of IDs at a higher price to those who need and can afford them (such as driver's licences, foreigner IDs, and travel documents).

5. Create a legislative framework and necessary limits and safeguards

Although Rwanda is performing well in this area of online service delivery, the data protection framework needs to be sensitized and become an integral part of the identity ecosystem. This will allow individuals, the state, local governments, and any legal entity to regulate the collection, processing (automated or manual), transmission, storage, and use of personal data. All conditions and guarantees under which various government agencies can access the data, and the conditions limiting the transfer of data to third parties, must be reinforced.

6. Ensure effective coordination among stakeholders

The development of a good system without hindrance is the result of effective and efficient institutional, technical, and policy coordination from the highest to the lowest level of the administrative structure. Coordination is essential to ensure that all stakeholders speak the same language: this makes it possible to develop and improve multi-stakeholder systems such as civil registration and identification. A clear scope of work and separation of responsibilities among stakeholders is needed.

For example, Rwanda has established a high-level coordinating CRVS committee, made up of five Ministers from the

- Ministry of Local Administration;
- Ministry of Gender and Family Promotion;
- Ministry of Justice;
- Ministry of Health; and
- Ministry of ICT and Innovation.

The next level of coordination is the Steering Committee. It is composed of the permanent secretaries of the above five ministries and the directors general of these six agencies:

- National Identification Agency;
- Law Reform Commission;
- Emigration and Immigration;
- National Commission for Children;
- National Institute of Statistics; and
- Rwanda Biomedical Centre/Ministry of Health.

The National Technical Working Group is composed of technical staff from the above ministries and agencies.

At the sub-national (district) level, a technical team from the CRVS works closely together.

ABOUT THIS SERIES

This country brief for Rwanda is part of the technical paper series: *Documenting the role of notification systems in capturing vital data about births and deaths for health surveillance amid a health crisis.*

The United Nations Economic Commission for Africa, the APAI-CRVS Secretariat, and the Centre of Excellence for CRVS Systems have partnered to support the development of this technical brief series on innovative, good practices facilitating the continuous and universal registration of vital events in Africa. This includes the generation of data for health surveillance during a health crisis, which has consequently mitigated the impact of COVID-19 on the performance of the civil registration systems. The overarching purpose of this technical paper series is to provide inspiration and policy guidance for CRVS programming in the African region in the midst of a global health crisis, such as the COVID-19 pandemic.

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